

dSPACE Release

New Features and Migration

Release 5.1 – May 2006



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How to Contact dSPACE Support

dSPACE recommends that you use dSPACE Support Wizard to contact dSPACE support. It is available

- On your dSPACE CD/DVD at \Diag\Tools\dSPACESupportWizard.exe
- Via Start – Programs – dSPACE Tools (after installation of the dSPACE software)
- At <http://www.dSPACE.com/goto?supportwizard>
You can always find the latest version of dSPACE Support Wizard here.

Software Updates and Patches

dSPACE strongly recommends that you download and install the most recent patches for your current dSPACE installation. Visit <http://www.dSPACE.com/goto?support> for software updates and patches.

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About this Document

This document provides you with a brief overview of the major new features of dSPACE Release 5.1 since dSPACE Release 5.0.

About dSPACE Releases

For information on how dSPACE software products are released, refer to *About dSPACE Releases* on page 7.

New features and enhancements

For a description of the key features, and a summary of the major enhancements made since dSPACE Release 5.0, refer to *Key Features of dSPACE Release 5.1* on page 9.

Migrating

In addition, this document provides you with information on the changes you may have to perform when you migrate from previous releases to dSPACE Release 5.1. Refer to *Migrating to dSPACE Release 5.1* on page 21.

Legend

The following symbols are used in this document.



Warnings provide indispensable information to avoid severe damage to your system and/or your work.



Notes provide important information that should be kept in mind.



Tips show alternative and/or easier work methods.

About dSPACE Releases

dSPACE products that form a seamlessly integrated tool chain and require the same set of third-party products are assembled in a dSPACE Release.

dSPACE Release number

A dSPACE Release number consists of two digits to identify major and minor releases (major.minor, for example, dSPACE Release 3.4).

A third digit is appended for a Maintenance Release, for example, dSPACE Release 4.0.1.

For patches, a patch number is appended to the dSPACE Release number (major.minor patch, for example, dSPACE Release 3.4p1).

Patches are free of charge and can be downloaded from the dSPACE Web site.

Maintenance Release

A Maintenance Release is typically installed as an add-on to a dSPACE Release. The latest patches, Product Releases, and MATLAB Compatibility Updates are assembled in a Maintenance Release.

Product Releases

Product Releases provide new products or new features for the current dSPACE Release.

MATLAB Compatibility Updates

MATLAB Compatibility Updates ensure that a dSPACE Release operates with a new MATLAB version until the availability of the next dSPACE Release (for example, MATLAB R14 Compatibility Update for dSPACE Release 4.1). They generally do not support new features of a new MATLAB version.

Dependencies on third-party products

A compatibility matrix provided in the `CompList.txt` file (see the root folder of the dSPACE CD/DVD) describes the dependencies of a dSPACE Release on the products of other vendors (MATLAB, compilers, Windows, etc.).

Key Features of dSPACE Release 5.1

Supported MATLAB releases

dSPACE Release 5.1 comes with the following key features:

The software of dSPACE Release 5.1 offers full compatibility with the following releases of MATLAB from The MathWorks:

- MATLAB R2006a+
- MATLAB R2006a
- MATLAB R14SP3
- MATLAB R14SP2+
- MATLAB R14SP2
- MATLAB R13SP2
- MATLAB R13SP1+

The RTI FlexRay Blockset of Release 5.1 does not support MATLAB R2006a and R2006a+.

For detailed information on compatibility, refer to <http://www.dspace.com/goto?Compatibility> on the dSPACE Web site.

Supported operating systems

The software of dSPACE Release 5.1 supports Windows 2000 and Windows XP (32-bit version only). It does not support Windows NT 4.0.

Implementation: key feature summary

The new key features of the implementation software are:

- A Vehicle Dynamics Simulation Package is available. It contains Simulink blocks to simulate the motion of a vehicle. A new tool, named ModelDesk, can be used to parameterize the models. ModelDesk can also create road models for simulation and visualization, and be used to define driving maneuvers.
- The implementation software for the RapidPro system that is used as an I/O subsystem has been extended. New RTI blocks have been added to the RapidPro Control Unit blockset to support the following features:
 - Measuring exhaust gas oxygen with the SC-EGOS 2/1 module
 - Measuring knock signals with the SC-KNOCK 4/1 module



To support the new RTI blocks for measuring knock signals, you have to install add-on software on your host PC after installation of dSPACE Release 5.1. This software is available for download at <http://www.dspace.com/goto?RTIRPCUKnock>.

For details on the new key features, refer to *New Implementation Features* on page 12.

Experiment and test: key feature summary

The new key features of the experiment and test software are:

- ControlDesk extensions:
 - Data captured from different platforms can be synchronized and displayed in the same plotter for easier comparison and analysis.
 - If you use the data set storage feature of RTI, you can use ControlDesk to create a new application image file containing a new data set without rebuilding the application.
 - The failure simulation component has been improved for the DS793 Sensor FIU. You can define timing sequences for switching the failure to simulate loose contacts or switch bouncing.

- AutomationDesk comes with:
 - Dialogs library containing blocks for implementing user interaction
 - AutomationDesk - Automation Server, cost-saving server variant for using batch scripts or customized user interfaces
 - AutomationDesk API to access AutomationDesk and Automation Server via COM interface

Refer to *New Experiment and Test Features* on page 19.

New Implementation Features

dSPACE Release 5.1 comes with several new implementation features, enhancements, and changes that apply to all dSPACE boards, see below.

In addition, there are changes that apply to specific dSPACE products:

- *New Automotive Simulation Model and ModelDesk* on page 13
- *New Implementation Features for Modular Hardware* on page 14
- *New Implementation Features for RTI CAN MultiMessage Blockset* on page 14
- *New Implementation Features for RTI Bypass Blockset* on page 15
- *New Features for ConfigurationDesk* on page 16
- *New Implementation Features for RapidPro System Used as I/O Subsystem* on page 17
- *New Implementation Features for RapidPro System Used as a Prototyping ECU* on page 18

General Implementation Features, Enhancements, and Changes

RTLib, RTI, and RTI-MP in dSPACE Release 5.1 provide the following hardware-independent new features and enhancements. Unless stated otherwise, these features can be implemented on all dSPACE systems.

Data set storage in application

When RTI is used, a real-time application contains the parameter values specified in the Simulink model it is built from. In earlier dSPACE Releases, you had to edit the values in the model and rebuild the real-time application to permanently change the values. RTI in dSPACE Release 5.1 allows you to store an additional set of parameter values later on without the need to edit the model or to rebuild the application. You can use ControlDesk to create an updated application image file from a parameter set.



- This features is only valid for MicroAutoBox and DS1005 (single-processor operation).

- You can use this feature only if you work with MATLAB R14.x or later.

For details, refer to *Real-Time Workshop Dialog (Model Configuration Parameters Dialogs)* in the *RTI and RTI-MP Implementation Reference*.

Tunable parameters with 3 or more dimensions

If the Inline parameters checkbox in the Model Explorer's Optimization dialog of your model configuration is selected, RTI generates additional entries for tunable parameters with 3 or more dimensions in the Tunable Parameters group of the variable description file. For details, refer to *Tuning Parameters of n-D Lookup Table Blocks* in the *RTI and RTI-MP Implementation Guide*.

New Automotive Simulation Model and ModelDesk

dSPACE Release 5.1 provides new Simulink models for simulating vehicle dynamics for hardware-in-the-loop testing:

Automotive Simulation Models

Automotive Simulation Models are open Simulink models for real-time simulation. You can use the models for hardware-in-the-loop testing of electronic control units or for early validation by Simulink simulation during the design phase of controller algorithms.

The ASM Vehicle Dynamics Simulation Package is new in dSPACE Release 5.1. This package contains all the Simulink blocks for simulating the motion of a vehicle. For details, refer to *ASM Vehicle Dynamics Reference* (available only after installation of this product).

ModelDesk

ModelDesk is a graphical user interface that allows you to perform intuitive model parameterization and project management for Vehicle Dynamics models. It also contains the Road Generator and Maneuver Editor. The Road Generator can be used to generate roads for simulation and visualization. The Maneuver Editor can be used to define how and where a vehicle moves. For details, refer to *ModelDesk Guide* (available only after installation of this product).

New Implementation Features for Modular Hardware

dSPACE Release 5.1 provides the following new implementation features and enhancements for modular hardware:

DS5101 The software of Release 5.1 supports the new board revision of the DS5101 (board revision DS5101-04).

New Implementation Features for RTI CAN MultiMessage Blockset

dSPACE Release 5.1 provides the following new implementation features and enhancements for RTI CAN MultiMessage Blockset:

J1939 basis support RTI CAN MultiMessage Blockset now supports J1939 (a separate license is required).

Source destination mapping Depending on its identifier, a CAN message defined in a J1939-compliant DBC file can be either a broadcast message or a peer-to-peer message. In a CAN-J1939 network of ECUs, a broadcast CAN message is transmitted to any ECU in the network. A peer-to-peer message is transmitted only to one destination ECU. For each CAN message defined in a J1939-compliant DBC file, the Source Destination Mapping page lets you specify the:

- Transmitting ECU (source ECU)
- Receiving ECU (destination ECU) for peer-to-peer messages

Without source/destination mapping, if two or more ECUs send the same message at virtually the same time, these messages would be placed in a container message. As a result you could not read the individual messages properly. With source/destination mapping, the two messages can be treated individually as separate instances of the message.

Gateway block Gateway blocks let you now activate or deactivate J1939 support for gatewaying messages.

RX error for wrong counter You can now use RX error ports to show whether a counter value is correct.

Each time the counter value is incorrect, the internal counter is automatically synchronized with the current value. This is also done whenever CAN communication is started, i.e. the first time the message is received. The first counter value is therefore always incorrect and causes an error bit.

Message variations

Overlapping signals are generally not allowed in the CAN standard. However, you can use message variations to generate overlapping signals into n variants of a message that do not have overlapping signals.

Traffic output

RTI CAN MultiMessage Blockset now lets you create a Traffic output that has a value of 1 when there is traffic on the CAN bus, otherwise the value is 0. This can be useful for network management purposes.

Gateway block support for two database files

The Gateway block now supports two database files: one for each direction to exclude messages from being gatewayed in this direction.

Free ID for Gateway block

The Gateway block now lets you add IDs to the exclude list that are not contained in the DBC file.

New Implementation Features for RTI Bypass Blockset

dSPACE Release 5.1 provides the following new implementation features and enhancements for the RTI Bypass Blockset:

Support of bypassing via DCI-GSI1

The RTI Bypass Blockset now supports service-based bypassing of ECU control functions via the following DCI-GSI1 (dSPACE Calibration Interface – Generic Serial Interface) interfaces:

- JTAG/OCDS
- JTAG/SDI
- NBD/AUD
- Nexus/READI
- Nexus/MPC55xx

When you configure the bypass hardware and bypass functions, the RTI Bypass Blockset lets you configure DCI-GSI1-specific settings.

New blockset features

The RTI Bypass Blockset now provides the following new features:

Automatic filling of the ECU variables list The Variable Selector, which lists the available ECU variables defined in the imported database file, can be filled automatically.

Display identifier The RTI Bypass Blockset now supports using the display identifier.

Port and signal names The RTI Bypass Blockset now supports using variable names as port names and/or signal labels separately.

Buffer synchronization

The RTI Bypass Blockset now supports the buffer synchronization mechanism (only for bypassing via DPMEM or DCI-GSI1)

Static DAQ lists The RTI Bypass Blockset now supports static DAQ lists (only for bypassing via XCP on CAN).

PID Off transmission The RTI Bypass Blockset now supports packet identifier (PID) Off transmission (only for bypassing via XCP on CAN).

Working with models from RTI Bypass Blockset 2.0

dSPACE Release 5.1 comes with the RTI Bypass Blockset 2.1. It is compatible with RTI Bypass Blockset 2.0, but the format of the data dictionary was changed. The data dictionaries of the Simulink models built with RTI Bypass Blockset 2.0 are automatically converted to the format used by RTI Bypass Blockset 2.1.



If you have a model that was saved with RTI Bypass Blockset 2.1 and want to use it with RTI Bypass Blockset 2.0, you must first delete the model's data dictionary and import the ASAM-MCD 2MC (A2L) file again. RTI Bypass Blockset then automatically creates a data dictionary according to the new format.

New Features for ConfigurationDesk

New supported hardware

The following new RapidPro hardware is supported by ConfigurationDesk 1.1.1 (on Release 5.1):

- SC-KNOCK 4/1 (DS1635): 4-channel module to connect piezoelectric knock sensors

New Implementation Features for RapidPro System Used as I/O Subsystem

The implementation software (RTI/RTLlib) for the RapidPro system that is used as an I/O subsystem comes with the following new features:

Measuring knock signals

The SC-KNOCK 4/1 module outputs signals indicating improper ignition timing (preignition). The following new RTI blocks have been added to the RapidPro Control Unit blockset (**rtirpcu**):

RPCU_SCKNOCK41_SETUP The block reserves an SC-KNOCK 4/1 module.

RPCU_SCKNOCK41_CTRL The block controls the knock signal measurement.

RPCU_SCKNOCK41_DATA The block returns the results of the knock signal measurement.



To support the new RTI blocks for measuring knock signals, you have to install add-on software on your host PC after installation of dSPACE Release 5.1. This software is available for download at <http://www.dspace.com/goto?RTIRPCUKnock>.

For detailed information on the feature, refer to *Measuring Preignitions with the SC-KNOCK 4/1 Module* in the *RapidPro System - I/O Subsystem MPC565 Implementation Features* document.

Measuring exhaust gas oxygen

The SC-EGOS 2/1 module outputs signals depending on the oxygen fraction λ of the exhaust gas and the temperature of the connected lambda probe. The following new RTI block has been added to the RapidPro Control Unit blockset (**rtirpcu**):

RPCU_SCEGOS21_DIAG_CTRL The block controls the short circuit detection from UN to UBAT on the SC-EGOS 2/1 module during run time.

For detailed information on the feature, refer to *Measuring Exhaust Gas Oxygen with the SC-EGOS 2/1 Module* in the *RapidPro System - I/O Subsystem MPC565 Implementation Features* document.

New Implementation Features for RapidPro System Used as a Prototyping ECU

dSPACE Release 5.1 provides the following new implementation features and enhancements for RapidPro system used as a prototyping ECU:

Digital outputs on the eTPU

The RTLib1603 now lets you use digital outputs on the eTPUs (enhanced Time Processing Units) in addition to the digital inputs on the eTPU.

Synchronous start of the eTPUs

The RTLib1603 now allows the eTPUs to start synchronously with the `ds1603_output_enable` function.

New Experiment and Test Features

dSPACE Release 5.1 has many new features and enhancements for dSPACE's experiment and test software.

New Features for ControlDesk

ControlDesk on dSPACE Release 5.1 comes with the following new features:

Synchronized data capturing

Data captured from different platforms can be synchronized and displayed in the same plotter for easier comparison and analysis. For details, refer to *Synchronized Data Capturing* in the *ControlDesk Experiment Guide*.

Creating an application image

If the data set storage option of an RTI model is enabled, you can use ControlDesk to create an updated application image from a parameter set. For details, refer to *Data set storage in application* on page 12 and *How to Create an Application Image* in the *ControlDesk Experiment Guide*.

Failure Simulation component

- The Failure Simulation component is improved for the DS793 Sensor FIU. A DS793 can simulate loose contacts or switch bouncing at an ECU input. This means a failure pattern can be switched between the failure potential and normal state several times in a specified timing sequence. You can define and manage timing sequences in the Failure Simulation component. For details, refer to *Simulating Loose Contacts or Switch Bouncing Using a DS793* in the *ControlDesk Experiment Guide*.
- For Failure Simulation Variant 2 the CANCardXL from Vector-Informatik is supported as a new CAN hardware interface.

New Features for AutomationDesk

AutomationDesk on dSPACE Release 5.1 comes with the following new features:

Dialogs library	The Dialogs library contains blocks for implementing input and message dialogs. The message dialogs can be used to provide execution messages which you want to be confirmed, the input dialogs can be used to prompt for user input during execution.
AutomationDesk Automation Server	The Automation Server is an AutomationDesk variant without graphical user interface. It can be accessed via the AutomationDesk API. You can use it, for example, for batch processing or integration into custom applications.
AutomationDesk API	With the COM-based AutomationDesk API, you can implement client applications in various programming languages for automating project handling in AutomationDesk. You can create and execute projects, but you cannot build new sequences. For further limitations, refer to <i>Limitations of the AutomationDesk API</i> in the AutomationDesk Guide.

Migrating to dSPACE Release 5.1

After you install dSPACE Release 5.1, it may be necessary to carry out additional steps.

Migrating from dSPACE Release 5.0

Refer to *How to Migrate from dSPACE Release 5.0* on page 22.

Migrating from dSPACE Release 4.2 or earlier

Refer to *How to Migrate from dSPACE Release 4.2 or Earlier* on page 23.

How to Migrate from dSPACE Release 5.0

Note the following points when migrating from dSPACE Release 5.0 to dSPACE Release 5.1:

Implementation Software

Support of the RTI FlexRay Blockset

If you work with MATLAB R2006a, dSPACE Release 5.1 does not support the RTI FlexRay Blockset.

Migrating to RTI CAN MultiMessage Blockset 1.3

If you want to use the new implementation features of RTI CAN MultiMessage Blockset 1.3, you must first add the relevant dialog pages to the dialog tree. For example, you can then switch to the maximum tree via the context menu of the dialog tree.

You must also create a new S-function for each RTICANMM MainBlock. You can do this via **Force "Create"** from the **Options** menu of the RTICANMM MainBlock.

Experiment and Test Software

Migrating to AutomationDesk 1.3

Updating projects If you open an AutomationDesk project that was saved with an earlier AutomationDesk version, the project is first updated. For large projects, it is recommended to use the dSPACE Project Update tool. You can start the tool via **Start - dSPACE Tools - AutomationDesk - Update AutomationDesk Project**. For further information, refer to the Project Update documentation, which you can find at the same location.

Type casting of strings With AutomationDesk 1.3, String data objects are of *unicode* type. If you use Python commands in Exec automation blocks that require a standard string as a parameter, you must cast a referenced String data object by using the `str` function, for example, `str(_AD_.UnicodeString)`.

How to Migrate from dSPACE Release 4.2 or Earlier

To migrate from dSPACE Release 4.2 or earlier to dSPACE Release 5.1, you have to migrate step by step via the intervening dSPACE Releases.



For example, if you want to migrate from dSPACE Release 4.1 to dSPACE Release 5.1, you have to follow the migration steps given in:

1. New Features and Migration of dSPACE Release 4.2
2. New Features and Migration of dSPACE Release 5.0
3. Finally, the migration steps given in *How to Migrate from dSPACE Release 5.0* on page 22.



The New Features and Migration documents for previous releases are available via Internet and on the dSPACE CD/DVD:

- Download them from <http://www.dspace.com/goto?migration>.
- Read them from the dSPACE CD/DVD (see the %dSPACE_ROOT%\Doc\Print folder). The PDF files are named *NewFeaturesAndMigrationxx.pdf*, where xx stands for the version or release number.

